

COLLECTING AND PROCESSING STACK AIR PARTICULATE AND VAPOR SAMPLES FROM TA-53

Purpose

This Air Quality Group procedure describes the requirements for changing and processing stack Particulate and Vapor Activation Product (P/VAP) samples on the two monitored stacks at TA-53 (Los Alamos Neutron Science Center) as part of the radioactive air emissions monitoring project.

Scope

This procedure applies to all ESH-17 and ESH-1/TA-53 technicians and staff who exchange the stack P/VAP samples or process the samples for stacks TA-53-7-2 (ES-2) and TA-53-3-3 (ES-3).

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Hazard Control Plan

The hazard evaluation associated with this work is documented in Attachment 1: Initial risk = **medium**. Residual risk = **low**. Work permits required: none. First authorization review date is one year from group leader signature below; subsequent authorizations are on file in group office.

Signatures (continued on next page)

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11/05/01

CONTROLLED DOCUMENT

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General information about this procedure

Attachments This procedure has the following attachments:

Number	Attachment Title	No. of pages
1	Hazard Control Plan	2
2	Equipment Needed for Exchanging Filters	1

History of revision

This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	6/2/93	New document, issued as HS-1/TA-53-STACK-DP-001.
1	7/21/94	Updated, and leak test added; issued as ESH-1/TA-53-STACK-DP-404 for inclusion in the ESH-1 site-specific procedure book.
2	7/11/95	Updated and reformatted; FE-16 removed from sampling.
3	5/20/96	Changed document control to AOT-FM (now LANSCE-FM); issued as 53FMP 104-01.3
4	8/13/99	Updated and re-formatted; changed leak test equation to match other leak tests; issued as ESH-17-601, R4.
5	11/1/00	Included access control issues at TA-53 Building 7, Room 200, as well as document change in sample collection date & time. HCP added as Attachment 1.
6	11/01/01	Quick-change fix to references of CFRs, retraining method to “read,” and reference to “Chain-of-Custody” form in Attachment 2.

Who requires training to this procedure?

The following personnel require training before implementing this procedure:

- individual(s) assigned to perform all or part of this procedure

Annual retraining is required and will be by **read** training.

Training method

The training method for this procedure is **on-the-job training** by a previously trained individual or subject matter expert and is documented in accordance with the procedure for training (ESH-17-024 or ESH-1-FO-04).

General information, continued

- Prerequisites** In addition to training to this procedure, the following training is also required prior to performing this procedure:
- ESH-17-011, “Logbook Use and Control”
 - ESH-13 training “Hazard Communication Introduction” (course # 2398)
 - Rad Worker training (course # 20301 & associated tests)
 - Facility Specific Training for unescorted access to TA-53 experimental areas (course #9693)
 - Limited Access Area training to access the ES-2 stack station in the MEB (course #18825)
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Definitions specific to this procedure P/VAP: Particulate and Vapor Activation Products; radioactive material, in the form of particulate matter or vapor, that is generated by interaction of the LANSCE ion beam(s) with air or beam line components.

- References** The following documents are referenced in this procedure:
- ESH-17-011, “Logbook Use and Control”
 - ESH-17-024, “Personnel Training”
 - ESH-17-026, “Deficiency Reporting and Correcting”
 - ESH-17-033, “Analytical Chemistry Data Review”
 - ESH-17-109, “Collecting Stack Particulate Filter and Charcoal Cartridge Samples”
 - ESH-17-612, “Calculating Weekly Particulate and Vapor Radioactive Air Emissions from Sampled Stacks at TA-53”
 - ESH-1-FO-04, “ESH-1 Radiological Control Technician Facility Orientation and Training Review Checklist for TA-53”
 - ESH-1-01-04, “Chain of Custody for Radiological Samples”
 - ESH-1/TA-53-DP-504, “Procedure for the use of Anti-C Clothing”
 - 49 CFR 173 Subpart I, DOT regulations for the transportation of Class 7 (Radioactive) material, sections 421, “Excepted packages for limited quantities of Class 7 (radioactive) material;” section 422, “Additional requirements for excepted packages containing Class 7 (radioactive) material;” and section 428, “Empty Class 7 (radioactive) materials packaging.”
 - 40 CFR Part 60, Appendix A, Method 5, Section 4.1.4, “Leak Check Procedures.”
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Note Actions specified within this procedure, unless preceded with “should” or “may,” are to be considered mandatory guidance (i.e., “shall”).

Overview of filter exchange

Overview of filter exchange	<p>This procedure describes the five processes required to perform the particulate and vapor (P/VAP) sample exchange:</p> <ul style="list-style-type: none">• preparation of new filter holders for the upcoming sampling period• exchange of the filter holders• removal of the filter material (paper and charcoal filters) from the old holders• delivery of the samples to HPAL for analysis• documentation and records resulting from this procedure
Location of filters and vacuum pumps on monitored stacks	<p>There are two monitored stacks at TA-53. Their names and locations are:</p> <ul style="list-style-type: none">• TA-53 Stack Fan Number ES-2, LANL Stack ID TA-53-7-2, is located in MPF-7 (MEB) room 200. The stack P/VAP filter holder is located about four feet above the floor on the west side of the stack. The vacuum pump for this filter is located inside the blue “weather house” immediately west of the stack.• TA-53 Stack Fan Number ES-3, LANL Stack ID TA-53-3-3, is located outside building MPF-3M on the southwest side up on the stack pad. The filter holder is located just above the elbow coming out of the ground. The vacuum pump is located inside MPF-3M at the 23-foot level, in the center of the west wall (near the “Merrimac” remote-handling unit).
Frequency of filter exchange	<p>A qualified ESH-17 or ESH-1/TA-53 technician exchanges the charcoal and paper filters each Tuesday morning. Typical change time is approximately 06:00. If ESH-1 is performing the sample changes, the changes may be made at other times to better accommodate shift work scheduling. Dates and times for sample changes may be modified with approval of ESH-17 staff.</p> <p>A typical exception to the “Tuesday morning” policy occurs during Tuesday holidays, extended holidays, or other Lab closure. In these situations, exchange samples on the next working day to allow prompt analysis by the analytical laboratory. Extra change cycles may be established as part of maintenance or test activities.</p>
Access to Building 7, room 200. (the ES-2 stack station)	<p>The ES-2 stack station is located in Building 7, room 200 [also called the Mechanical Equipment Building (MEB)]. Due to potential accident scenarios, this building is designated a “Limited Access Area” when beam operating conditions warrant. Entering the MEB during these times requires additional training and the wearing of an electronic personnel dosimeter (EPD). Complete access requirements are put forth in the training.</p>

New filter holder preparation

Background

It is necessary to leak check the filter holders each week prior to installation in the system. A small vacuum pump has been set up in the south work area of MPF-3M Rm 105 (TOFI) to perform these checks. Since the entire sampling system can have a leak rate of only 0.02 CFM, the filter holders must have a leak rate of no more than 0.01 CFM. The 0.02 CFM leak rate requirement is described in 40 CFR Part 60, Appendix A, Method 5, Section 4.1.4, "Leak Check Procedures."

Steps to assemble and leak test the filter holders

To assemble and leak test the new filter holders, perform the following steps:

Step	Action
1	Collect the equipment listed in Attachment 1.
2	Obtain new sample filters and the filter assemblies from the storage areas in MPF-394, Room 115 (ESH-1 Source Room), MPF-3M, room 105 (TOFI), or other supply area as designated by ESH-17 staff. When obtaining the filters, note the supply level. If the supply appears to be low, notify the ESH-17 staff member assigned to TA-53 to obtain more filters.
3	Label each paper filter on the back side (rougher side) of the filter with the following information: <ul style="list-style-type: none">location (Stack ID, e.g. "TA-53-ES-3" or "TA-53 -ES-2")date and estimated placement time (date and time should correspond to the date and time that the filter holder will be placed in service, not the time the filters were loaded and tested) Label the side of the charcoal filter canisters with the same information.
4	Take the new filters to the TOFI area for assembly and leak checking.
5	Inspect the filter holder interior and if necessary, remove any foreign material with a Kimwipe and cleaner (e.g., Fantastik™ or Windex™).
6	Lay the paper filter flat in the base of the holder and screw the holder section inlet and paper holder together. Next, put a new charcoal filter in place and screw on the remaining end. Ensure that the flow will be through the smooth side of the filter paper and that the flow direction through the charcoal is as indicated by the arrows on the filter.
7	Install the holder on the vacuum pump system and plug the open end of the holder with the available blank fittings or rubber stoppers.

Steps continued on next page.

New filter holder preparation, continued

Step	Action
8	Open the ball valve and start the vacuum pump. Using the needle valve with the round handle, adjust the vacuum to 40-50 inches of water.
9	Shut the ball valve to isolate the filter holder system.
10	Turn off the vacuum pump.
11	Start the stopwatch to begin the leak test. Note the pressure at the start of the leak test (t=0 seconds).
12	After two minutes, check the pressure on the system. If the pressure rise is less than 15 inches of water during the 2 min, assume the filter passes with a leak rate of less than 0.01 actual CFM and skip to step 15.
13	<p>If the pressure rise is greater than 15 inches of H₂O, calculate the leak rate using this formula and record the results in the stack log book:</p> $Q_{actual} [acfm] = \frac{\Delta P * V_{system}}{T_{system} * \Delta t * 42.2} * \frac{1 \text{ atm}}{P_{actual}} * \frac{T_{actual}}{273 \text{ Kelvin}}$ <p>Where:</p> <p>Q_{actual} = leak rate (actual cubic feet per minute)</p> <p>ΔP = the difference in pressure between the start and the end of the test time, in inches of water.</p> <p>T_{system} = system temperature, converted to Kelvin by the formula: (T(°F) – 32)/1.8 + 273 = T(Kelvin)</p> <p>Δt = Elapsed time in minutes</p> <p>V = Volume of system being tested, in Liters (7.08 liters, including “buffer” volume of 6.88 L)</p> <p>42.2 = Factor incorporating the ideal gas constant and all unit conversions.</p> <p>P_{actual}, T_{actual} = ambient pressure (in atmospheres) and temperature (in Kelvin) during test.</p> <p>NOTES:</p> <ul style="list-style-type: none"> The 6880 cc buffer volume is included in the volume of the leak test system. The last two terms in the above equation convert standard conditions (1 atmosphere pressure and 273 K temperature) to actual conditions in Los Alamos during testing. For ease in analysis, a standard value of 1.4 can be used in place of the <i>product</i> of these two terms.

Steps continued on next page.

New filter holder preparation, continued

Step	Action
14	If the leak rate is above 0.01 CFM, disassemble the holder, inspect, and clean if a cause for the leak can be found. Re-assemble the holder and repeat the leak check starting with step 5. There are a limited number of the holders available, so every effort should be made to find and fix the cause of the leak. If it will not test below the limit, get another holder from available stock (contact the ESH-17 staff member for assistance if needed). If new parts are used or other major problems are encountered, tag any old or replaced parts and notify the ESH-17 staff or his/her designee.
15	Repeat leak test (steps 3 -- 14) for the other stack(s) sample assembly(s).
16	Record in the ES-3 stack logbook the date and time of sample filter tests and result of tests.
17	If the leak rate is less than the 0.01 CFM limit for all sample assemblies, put the prepared assemblies in locked storage, either in MPF-394-105, the TOFI area, or other area designated by ESH-17 staff.
18	Begin chain-of-custody paperwork for the prepared samples to demonstrate that the leak-check is valid at time when sampling begins. See the chapter <i>Chain-of-Custody for Samples</i> (in this procedure, below) for more information.

Filter holder exchange

Filter change times

Change the filters (prepared earlier as described in the preceding chapter) on Tuesday mornings at 08:00. If ESH-1 is performing the sample changes, the exchanges may be made at 06:00 to better accommodate shift work schedules. During Tuesday holidays, exchange the samples on the next workday to allow prompt delivery to the analytical laboratory.

The sample exchange times may be altered by ESH-17 staff if needed.

Steps to exchange the filter holders

Perform the following steps to exchange the filter holders:

Step	Action
1	If operating conditions at ES-2 warrant, obtain an electronic personnel dosimeter (EPD) from the TA-53 ESH-1 Field Office personnel. If you are unsure if supplemental dosimetry is required, contact ESH-1 at 667-7069 or the ESH-17/LANSCE staff.
2	Proceed to either the ES-2 or ES-3 stack sampling station. At the stack site, don a pair of latex gloves prior to handling the filter assemblies.
3	Locate the inlet side of the filter assembly and disconnect it from the system using the quick connect. The inlet side must be removed first to prevent the loss of material collected on the filters. NOTE: On ES-3, the inlet side is on the <u>bottom</u> of the filter holder. On ES-2, the inlet side is on the <u>top</u> of the filter holder.
4	Remove the outlet side of the filter assembly using the quick connect and place this filter assembly inside a plastic bag.
5	Install the new filter sample holder using the quick connects. Either the inlet or outlet end of the filter assembly may be attached first.
6	Prior to leaving TA-53, return to the P/VAP vacuum pump location for that stack, and adjust the flow rate to the value posted at the pump location. Due to slight differences between filter assemblies, the flow rates may change after the assemblies are exchanged.
7	Repeat steps 2-6 for the other stack. Note potential access requirements at the ES-2 station.
8	Proceed with the “removed” filter assemblies to the ESH-1 Source Room for sample media removal.

Paper and charcoal filter removal

Background Changing the filter materials can be difficult, especially after they have been made leak tight. They should be opened in the ESH-1 source room (building 395, room 101) which is controlled for contamination. Care should be exercised when opening the filters to ensure that the filters are kept intact and to minimize the risk of radioactive material loss and cross-contamination.

**Steps to
remove the
filter material**

To remove the filters from the filter holders, perform the following steps:

Step	Action
1	Label all plastic bags and glassine envelopes prior to beginning work to avoid excessive handling of the potentially contaminated filter media. The bags should be labeled with the stack ID and date(s) of sampling.
2	Don latex gloves to prevent contamination. If necessary, put down a sheet of mazzlin or plastic on workbench for contamination control.
3	Disassemble the outlet side of the filter holder and expose the charcoal filter cartridge.
4	Carefully transfer the charcoal filter from the holder to a plastic ziplock bag. If excessive contact is made between gloves and the filter, change gloves.
5	Remove the inlet half of the filter holder and expose the paper filter.
6	Use tweezers to remove the filter and place it in a glassine envelope and then into a plastic ziplock bag. Clean the tweezers by wiping them on the gloves being worn or a Kimwipe®.
7	Repeat steps 2-6 for the other stack(s) sample assembly(s). When all samples are collected, put the assemblies back together. Once together, the assemblies are not contamination concerns.
8	Discard mazzlin or plastic sheet (if used) into the rad trash box. Remove gloves (turning them inside-out in the process) and dispose of them in the rad trash box, along with any Kimwipes® used.
9	Prior to leaving TA-53 controlled areas, survey your hands and clothes for radiation by self-frisking, a portal monitor, or by contacting an ESH-1 RCT.

Steps continued next page

Paper and charcoal filter removal, continued

Step	Actions, continued
10	<p>The dose rates of the collected media must be measured. Request ESH-1 to perform a dose rate survey and tag the baggies.</p> <p>If dose rates are in excess of 5.0 mrem/hour, notify the ESH-17 staff member, return the sample media to a locked cabinet, and allow it to decay to 5 mrem/hr or less before transporting the samples to HPAL.</p>
11	<p>Continue the chain-of-custody for the stack samples as prescribed in the chapter <i>Chain-of-Custody for Samples</i> (in this procedure, below) or procedure ESH-1-01-04 “Chain of Custody for Radiological Samples.”</p>
12	<p>Initiate analysis request paperwork. During LANSCE operations, the sample media should be marked with a “PRIORITY” analysis label so accurate measurements of short-lived radionuclides will be made.</p> <p>Submit all paper filters under one analysis request and charcoals under a second analysis request.</p> <p>Record requests in the appropriate sample logbook.</p>
13	<p>Keep chain-of-custody records updated for all transactions.</p>
14	<p>Return the empty sample assemblies to their designated storage area (e.g., TOFI, 53-3M-M105).</p>

Delivery of samples to HPAL

Background HPAL requires one chain-of-custody and analysis request form for paper samples and one form for all the charcoal filter samples. Each sample must be less than 5.0 mrem/hr. The samples must also be packaged in accordance with transportation requirements in 49 CFR 173.421, 173.422, and 173.428 for delivery to HPAL over public access highways. The steps below ensure that these DOT requirements are met.

Deliver the samples to HPAL for analysis as soon as possible after sample removal; before noon Tuesday is the ideal target delivery time.

Package Label The package uses a reversible label to indicate its current status, indicating whether the container is empty or that potentially radioactive samples are inside. Specific criteria for the label is stated in 49 CFR 173.422. The required wording is as follows:

[empty package]

This package conforms to the conditions and limitations specified in 49 CFR 173.428 for radioactive material, excepted package – empty package, UN2910.

[limited quantity of radioactive material]

This package conforms to the conditions and limitations specified in 49 CFR 173.421 for radioactive material, excepted package – limited quantity of material, UN2910.

Delivery of samples to HPAL, continued

Steps for preparation and delivery to HPAL

To deliver the samples to HPAL for analysis, perform the following steps:

Step	Action
1	If necessary, update the chain-of-custody form when the samples are removed from the storage locker.
2	Package the samples and chain-of-custody forms inside the appropriate packaging (e.g., a cooler with secure lid) for transport to HPAL. Turn reversible label on transport container to indicate potentially radioactive samples are inside. Transportation requirements include: <ul style="list-style-type: none"> • Samples must be in secondary containment (baggie or can). • Sample activity cannot exceed 5 mrem/hr measured at contact of secondary containment. • Use a government vehicle (no personal vehicles). • Samples must be carried in a container (such as plastic box or cooler) with a secure lid that will not easily pop open. • The radiation level at any point on the exterior of the container cannot exceed 0.5 mrem/hr.
3	Deliver the samples to HPAL at TA-3 SM 2010.
4	Sign the HPAL Submittal Form and Chain-of-Custody Record to transfer custody of the sample to HPAL. Keep the Chain-of-Custody Record for ESH-17's records.
5	Have an HPAL representative sign the HPAL Submittal Form to document HPAL acceptance of sample custody.
6	Log sample information into the HPAL database as prompted by the database.
7	Retain the yellow copy of the HPAL Submittal for ESH-17's records.
8	On the transport container, flip the reversible label to indicate an empty package.

Review of analytical results

HPAL will send copies of the results to the ESH-17 analytical chemistry coordinator. After review of the data according to ESH-17-033, the analytical chemistry coordinator issues a memo to the LANSCE emissions coordinator, copied to the ESH-1/TA-53 Field Office.

The **LANSCE coordinator** and **ESH-1 Field Office responsible individual** review the analytical results according to procedure ESH-17-612. If any unusual isotopes or quantities are observed, investigate the issue to determine if a problem is present. After the review, file the results in the sample logbook.

Chain-of-custody for samples

Maintaining custody of samples

A sample is physical evidence collected from a facility or the environment. Chain-of-custody must be documented for all samples used to demonstrate compliance. Verify that the possession and handling of samples is traceable at all times. A sample is considered in custody if it is one of the following:

- In one's physical possession.
- In one's view after being in one's physical possession.
- In one's physical possession and then locked up so that no one can tamper with it.
- Kept in a secure area where access is restricted to authorized and accountable personnel only.

NOTE: A secured area is an area that is locked, such as a room, cooler, vehicle, or refrigerator. If the area cannot be secured by locking, use a custody seal to secure the area or the sample container.

Procedure ESH-17-109 has more information and samples of forms that can be used for initiating chain of custody.

Transferring custody of samples

Whenever samples are transferred into the custody of another person or organization, complete the "relinquished by/received by" and "date" sections of the form. These sections of the form must provide a complete history of custody of the samples from collection to transfer to the analytical laboratory.

If chain-of-custody is broken

Whenever there is a break in the chain of custody of a sample, document the failure by initiating a deficiency report in accordance with the procedure for deficiencies (ESH-17-026). [The deficiency process will document the occurrence, evaluate the potential impact (if any) on the samples, and propose a fix to prevent recurrence.]

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be filed **within one week** in the location indicated:

- entries in the stack logbook.
- entries in the logbook for air samples located in the ESH-1/TA-53 Field Office or other assigned location.
- chain-of-custody forms for the filters in the Field Office chain-of-custody logbook or in ESH-17 records center.
- analytical results returned from HPAL in the logbooks for HPAL results in the assigned staff member's office.

HAZARD CONTROL PLAN

1. The work to be performed is described in this procedure.
“Collecting And Processing Stack Air Particulate And Vapor Samples From TA-53”

2. Describe potential hazards associated with the work (use continuation page if needed).

All as described in HCP-ESH-17-TA53-XA, as supplemented and superseded by:

rad hazards:

- a) direct radiation from stack;
- b) contamination concerns: during beam operations, sample media is considered contaminated and must be accordingly
- c) accident scenarios: During operations to the 1L Target, the stack station at Building 7, ES-2 is inside a “Limited Access Area” due to excessive external dose rates encountered if a design basis accident occurs.

charcoal: health effects from ingestion or breathing

3. For each hazard, list the likelihood and severity, and the resulting initial risk level (before any work controls are applied, as determined according to LIR300-00-01.0, section 7.2)

Radiation hazards:

- a) direct rad from stack: probable / moderate = Medium (hazards are much lower after beam is NOT in operation for > 1 week)
- b) contamination: probable / moderate = Medium (hazards are much lower after beam is NOT in operation for > 1 week)
- c) accident scenario: remote / catastrophic = Medium

charcoal: remote / moderate = minimal

Overall *initial* risk: ☐ Minimal ☐ Low ☒ Medium ☐ High

4. Applicable Laboratory, facility, or activity operational requirements directly related to the work:

☐ None ☒ List: Work Permits required? ☒ No ☐ List:

- LIR-402-706-01 “Personnel Dosimetry”
- Consult with ESH-1 at 7-7069 for applicability of radiological work permit for handling samples.
- Detailed procedures eliminate need for RWP in typical situations.
- LIR404-00-01.2 details criteria that must be followed when generating radiological waste.
- Controlled areas at TA-53 require a TLD for access.

HAZARD CONTROL PLAN, continued

5. Describe how the hazards listed above will be mitigated (e.g., safety equipment, administrative controls, etc.):

rad:

- a) direct rad: minimize time near stacks; have sample assemblies and PPE ready in advance
- b) contamination: wear gloves when handling sample assemblies and sample media. Samples are stored in glassine envelopes and/or plastic bags to prevent cross-contamination and spread of rad material. Workers will self-frisk or be checked by an RCT for rad contamination after handling samples.
- c) Accident: all workers needing access to Building 7, room 200 must take Limited Access Area training and abide by requirements put forth in the training, including supplemental dosimetry as required.

Note: Transport of radioactive materials can only be performed in government vehicle, with materials in secondary containment and a box that will not pop open in case of an accident. All transportation will be done in accordance with 40 CFR 173.421.

charcoal: avoid breathing in such material; do not break open the individual charcoal cartridges

6. Knowledge, skills, abilities, and training necessary to safely perform this work (check one or both):



Group-level orientation (per ESH-17-032) and training to this procedure.



Other → See training prerequisites on procedure page 3. Any additional describe

here:

All as described in HCP-ESH-17-TA53-XA and page 3 of this procedure.

7. Any wastes and/or residual materials? (check one) ☐ None ☒ List:

Used sample media are returned after analysis by analysis laboratory. Dispose of media in radiological trash.

8. Considering the administrative and engineering controls to be used, the *residual* risk level (as determined according to LIR300-00-01.0, section 7.3.3) is (check one):



Minimal



Low



Medium (requires approval by Division Director)

9. Emergency actions to take in event of control failures or abnormal operation (check one):



None



List:

During LANSCE accelerator operation, the Central Control Room (CCR) and ESH-1 offices are staffed 24 hours, 7 days. Contact these offices for assistance as needed.

CCR: 667-5729; Building 4, room 203.

ESH-1 Field Office: 667-7069, Building 395, room 101.

Signature of preparer of this HCP: This HCP was prepared by a knowledgeable individual and reviewed in accordance with requirements in LIR 300-00-01 and LIR 300-00-02.

Preparer(s) signature(s)

Name(s) (print)

/Position

Date

Signature by group leader on procedure title page signifies authorization to perform work for personnel properly trained to this procedure. This authorization will be renewed annually and documented in ESH-17 records.

Controlled copies are considered authorized. Work will be performed to controlled copies only. This plan and procedure will be revised according to ESH-17-022 and distributed according to ESH-17-030.

EQUIPMENT NEEDED FOR EXCHANGING FILTERS

Quantity	Item
2 ea.	Two inch LB-5211 (or equivalent) paper filters
2 ea.	Hi-Q 5211-20 TEDA (or equivalent) impregnated carbon cartridges
2 ea.	Glassine envelopes for paper filters.
1 ea.	GM beta/gamma portable survey meter (either 14C or ESP-1). This instrument is available in the ESH-1 sample room for use by ESH-1 or ESH-17 personnel.
multiple pairs	Rubber or latex surgeons gloves (at least one pair); standard anti-contamination PPE-style
4 ea.	Small plastic zip lock bags (4"x4") for sample filters
2 ea.	Large plastic zip lock bags for sample filter transport
1 ea.	Tweezers
2 ea.	Stack Sample Data Form and Chain-of-Custody Record (Attachment 2 to ESH-17-109)
1 ea.	Spray cleaning solution (e.g., Windex™ or Fantastic™)
1 box	Paper Lab wipes, e.g, Kimwipes™
1 ea.	Stopwatch or timer
1 set	Tools - including strap wrench and pliers
1 ea.	Calculator